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GEOLOGY, No. 3.—ON THE CONSTITUENT MINERALS, AND THE STRUCTURE OF THE PRIMARY ROCKS.

ALTHOUGH the exact line which divides the primary rocks from the division called transition, has not yet been universally agreed upon by geologists, yet we conceive this to be in a great measure occasioned by the prevalence of a theoretical opinion, which has drawn their attention too much from characters of a more definite kind, than those depending upon a supposed first appearance of organic remains. If it be true, that there was a moment in the history of our planet, subsequent to the existence of inorganic matter, when organized bodies, vivified by animal and vegetable life, first began to appear, and that the evidence of such appearance is now to be found in the crust of the earth, we conceive,—without denying the reasonableness of this theory —that the substantial proofs of it have not yet been brought forward. It will require a prodigious concurrence of observation, that we cannot reasonably look forward to, in our own time, before a unanimous opinion can be produced, that the lowest bed, in the descending order of the series, has been ascertained, which contains organic remains, and that the search need be continued no further. Practical geologists are well aware of the great difficulties attending the establishment of a line, to be considered as the basis of this hypothesis, which has formed so strong a connexion with geology, and which, if it could be demonstrated, would raise it to a very high rank as a science, both for its exactitude, and the dignity it would derive from so remarkable an illustration of ant-œval chronology.

We have the less regret in believing we shall never witness the demonstration of this hypothesis, because we think a line exists, separating the primary rocks from those called transition, which will serve all the purposes of the proposed theoretical division, depending upon organization, and which every one may demonstrate for himself, who has a proper knowledge of the mineral character of rocks. Our desire of making what we have to say on this branch of our subject, intelligible to our uninitiated readers, will lead us at present into some elementary details, necessary to a clear understanding of the mineral nature of all rocks, and especially of the great characteristic difference between those beds comprehended in the primary division, one to four inclusive,* and all the other beds enumerated in the series. The line of which we have spoken, we conceive to be constituted where the primary rocks terminate; for, as it will be hereafter seen, although the constituents of all the rocks contained in the crust of the earth, are substantially the same, yet all geological writers of any reputation, now agree that the primary and secondary rocks—including in these last, all rocks lying above the primary,—have been brought into their places by two different agents. It appears, therefore, to be more consistent with observation to say, that a transitionary state of the beds of the planet commenced, when the agency which brought the primary rocks into their places appears to have ceased, and when that which deposited the secondary rocks, appears to have commenced. In this view of the subject, we exclude, for the present, the intrusive rocks, which, as we have stated at page 342, we have also excluded from the tabular view. We have adopted this manner of treating the subject, that our readers may pursue it, uninfluenced by the prejudice which the theories and terms belonging to the infancy of geology have impressed too many with. We now proceed to elementary details.

All the rocks, in whatever part of the series they may be found, have, for their constituent elements, very few substances or earths. The four principal ones are *silica*, *alumina*, *lime*, and *magnesia*. Potash and soda also, with iron, in various states of oxidation, enter, with these earths, as ingredients into many rocks. We owe to Sir Humphrey Davy the brilliant discovery

* Vide Table, page 338

that all these earths are compounds of oxygen united with metallic bases, so that the whole mineral volume of the planet, may be considered as a mass of metals and their modifications. Ochre, or ferruginous earth, is easily converted into iron, as it is constantly done at the furnaces. It stands in the same relation to that metal, which the rust found upon polished steel does, when exposed to moisture; both of them are oxides of iron. Quartz, flint, sand, all substances which are purely silicious, can also, but with greater difficulty, be converted into their metallic base, silicum. The same may be asserted of lime and magnesia.

Mineral bodies are purely simple, when they consist of one kind of earth unmixed with any other; and compound, when their constituents are formed of more than one mineral substance. Besides this variety in their composition, it is to be remarked, that their structure is various, some being formed of separate minute bodies of the same substance mechanically approximated together, and others being an aggregate of irregular crystals, produced by an apparent simultaneous crystallization. This distinction is of the highest importance in relation to the dividing line, of which we have spoken, between the primary and secondary rocks.

Silica, is the basis of rock crystal, quartz, flint, chert, and sandstone. The first of these substances presents us with silica in its purest crystalline form; the last is an aggregate of minute bodies of silica mechanically approximated together.

Alumina, is the basis of the sapphire; but the best kind of Fuller's earth, and the purest clays, are aggregates formed of alumina.

Lime, is the basis of all calcareous bodies, but the best statuary marble, as well as many sub-crystalline limestones, is an aggregate of irregular crystals, produced by an apparent simultaneous crystallization.

Magnesia is not frequently found pure, but it enters freely into the composition of some of the primary rocks, as we shall hereafter have to state, and occurs also in certain limestones.

These earths, sometimes simple, sometimes in a compound state, together with the alkalies, oxides of iron and manganese, sulphur in combination with lime, carbon, and a few other metals, sometimes disseminated in, at other times imbedded, are the constituents of compound rocks, which often present an uni-

formity of appearance, where particular minerals predominate, as in the case of mica slate and hornblende. A very slight practical acquaintance with rocks will enable students in geology to detect their leading characters. The *conglomerate rocks* are more easily distinguished than the rest, being compounded of fragments of other rocks, united partly mechanically, and partly chemically; these fragments are of various sizes, from that of the smallest particle of gravel, to masses of many pounds weight. Having thus treated, in an elementary manner, of the general nature of the simple bodies which are the constituents of rocks, we proceed to describe that rock, called granite, which lies at the bottom of the whole series, and which is of such universal occurrence in all countries.

Granite, so called from its granular appearance, is a compound rock, formed of one simple mineral, *quartz*, and two compound minerals, *felspar* and *mica*. The properties of quartz are great hardness, giving abundance of sparks. It is infusible without alkalies, but with them it melts and forms glass. It is often slightly combined with alumine. In granite, it has a vitreous translucent appearance, appears to be the result of an imperfect crystallization, and may be considered as a silicious mass imbedding imperfect crystals of felspar and mica. The various proportions in which these three substances enter into granite rocks, constitute a great many varieties. In some of them, the grains are very small; in others, the crystals of felspar are large, and more regular. Granites, of this last class, have received the awkward name of porphyritic granites, a term badly applied to white coloured crystals.

Felspar, is a compound mineral, consisting of various proportions of *silica*, *alumina*, *potash*, and, occasionally, *soda*, a small portion of *lime*, and *iron*. It sometimes constitutes the largest part of granite rocks. When in a perfect state it is nearly as hard as quartz; but when it decomposes, which is often the case, the particles constituting the granite rock, no longer cohere, but fall into the condition of gravel. The usual colours of felspar, are white, and many varieties of red. This mineral sometimes occurs in immense masses, when it is called compact felspar, trachyte, white stone, eurite. In many countries, beds of felspar are worked for the porcelain manufactories. In the State of Delaware, there are extensive localities of it, as well as on the

borders of the adjoining State of Pennsylvania, both compact and decomposed.

Mica is also a compound mineral, consisting of various proportions of *silica*, *alumina*, *potash*, a considerable quantity of *oxide of iron*, and some *magnesia*. It readily divides into very thin and transparent laminæ, or scales, with a fine silvery lustre. These laminæ are elastic, and in this quality differ from *talc*, which is a mineral compound of the same nature, but whose laminæ, or plates, are non-elastic, although flexible. Mica is always translucent, sometimes black, and in the granitic veins, and beds of compact felspar on this continent, is frequently found in congeries of hexagonal plates.

The various proportions in which these constituents of granitic rocks meet in mineral masses, have produced many varieties of that kind of rock which lies at the bottom of the geological series, and which has received the name of granite. This term, however, is frequently misapplied to other rocks, which do not lie at the bottom of the primary division, from their having a vague resemblance to true granite. When hornblende is present, to the exclusion of mica, it generally becomes a syenite, a rock which is found frequently much higher up in the series, although hornblende is occasionally found in true granite. When it is an aggregate, compounded of felspar and hornblende, to which the French mineralogists have given the name of diabase, it is a true mineralogical greenstone. (Vide p. 311.) Compounds, also, of felspar and quartz, are called graphic granite. This mineral is found in granitic veins, and beds of felspar, which, probably, are only ancient dykes of felspathic matter. It has a very beautiful appearance, from the curious intermixture of the felspar and quartz. The mass of the felspar has a pearly aspect, with a glassy and resplendent fracture, occasioned by a parallel polarity of all its minute portions. The quartz intervenes and crosses, in a manner to present a confused resemblance to ancient literary characters; hence its name of graphic granite. From the whole surface of the felspar, the incident rays are reflected to the eye, at the same angle, with very striking effect.

When the felspar decreases in granite, and the small scales of mica increase in quantity, and are arranged in layers, the rock loses the massive structure belonging to granite, and be-

comes schistose, or slaty, and splits into parallel tables. Werner applied the term *gneiss* to those slaty granites, of which there are many varieties. That kind which is nearest in position to the granite, is generally large grained, its foliation imperfect, and contains occasionally patches of true granite. This kind of gneiss is less fissile than the slaty or schistose varieties. From the parallelism of the layers of gneiss, which often gives it a striped appearance, it has not only been deemed by some a stratified rock, but that this linear regularity is the result of aqueous deposition. We conceive these opinions to be premature, and derived from partial examinations. No doubt this rock often, for considerable distances, presents a stratified appearance, arising altogether from the distinct parallelism of the layers of mica; but these layers, and the consequent fissile property of the rock, may be as reasonably referred to igneous fluidity, since other minerals occur in traps, arranged in a laminar way, and giving a fissile tendency to the rocks they are thus found in; mica itself, too, has been found in veins of trap, holding the same parallelism that it does in gneiss. Sometimes, in gneiss, these layers, after maintaining their linear appearance, are gradually lost in amorphous masses; it is difficult to conceive of the possibility of materials being thus brought together by aqueous deposit; and the passage of granite into gneiss, which has been proved in such various ways, together with other circumstances, certainly points to a common origin for both granite and gneiss.

Some of the varieties of slaty gneiss pass into *Mica slate.* When quartz and mica, two of the constituents of granite, are well combined together, they form this rock, which splits easily into tables. Sometimes the plates of mica are so large, as to give it a coarse character; at other times, the quartz and mica are so intimately combined, that the mica slate is very fine. It usually has a light gray colour, derived from the black and white mixture of its constituents, but has frequently a yellowish and greenish hue, with a pearly lustre. Sometimes beds of this mineral are found alternating with gneiss, and it is frequently traversed by seams of quartz, running parallel with the plane of its own bed. These seams increase in thickness as they descend, indicating their inferior origin. Mica slate is usually found associated, more or less, with the granite and gneiss of this con-

tinent, and in some situations, is studded with brilliant small garnets.

This rock as well as the gneiss has been considered by some of aqueous origin, from the regularity of its beds, and especially from its enclosing occasionally fragments of breccia of quartz, granite, and even limestone. This conglomerate character has been thought important towards deciding its aqueous character. We have seen, however, in the case of gneiss, that a parallel disposition of mineral laminæ, is also common to rocks of avowed igneous origin; and as brecciated fragments of older rocks have been found in trap veins, their appearance in mica slate is only a phenomenon of the same kind: primary limestone, it is true, is not an older rock, according to the geological series, than mica slate; but nodules, and patches of this mineral substance, have been found even in gneiss, as we shall have occasion hereafter to state.

We shall consider the important subject of mineral and metallic veins, as they are found in the primary rocks, in our next number. We purposely defer it, as it is probable we shall commence, in that number, a mineralogical and geological account of what is called the gold region of this country. We hope to make this more interesting by a general account of mineral and metallic veins, one of the most curious and interesting branches of geology.

ON THE COMPARATIVE ENCOURAGEMENT GIVEN TO THE STUDY OF NATURAL HISTORY IN EUROPE AND NORTH AMERICA.

A PAPER on so interesting a subject as our title comprehends, ought to be favourably received in this country. If the comparison should prove favourable to us, our naturalists will not be without encouragement, and, at any rate, it will be well enough for them to know the truth. We have long wished to lay before our readers some details and reflections concerning that branch of our literature, which is more or less devoted to natural science, and the late republication of Audubon's Ornithological Biography, furnished us with an agreeable opportunity for doing so. On the appearance of that work,—which, independent of

its great merit, is one of the handsomest volumes the American press has ever produced,—we were not quite prepared; as it was our intention, to close our observations, by a general view of Mr. Audubon's labours. We perceive, it will not be consistent with the arrangements made for the present number, to include all we have to say in the limited monthly pages at our command, and as we give, in the present number, a very interesting letter from Mr. Audubon, we have determined to divide the subject; to give our remarks on the comparative encouragement which the study of natural history receives in Europe and America, in the present number, and our review of Mr. Audubon's labours in the next.

It is an exceedingly difficult thing to persuade those who have never expended a thought on the subject, that all the comfort of civilized nations, depends upon the proper application of that sort of knowledge, which is only to be attained by the study of nature itself. It is equally difficult to persuade them, that the most charming moments in life, are those when the mind clearly perceives the simple fitness and beauty of nature's ways, so dissimilar to the tortuous labyrinths of human conduct, as it is exemplified in the actions of men. We live in the midst of nature, it is nature who teaches us every thing; who taught Newton the laws of matter, the properties of light; who taught Watt how to manage heat for the benefit of mankind;—nay, if we look to the moral power possessed by nations and individuals, it is always the result of a profound and various attention given to nature—and yet there are thousands who are told this, who do not believe it, or will not take the trouble to think on the subject. In the history of the progress of the human mind, we see the manifestation of this great truth. During the fourteenth century, the annals of European literature are altogether barren of natural history, and with a few solitary exceptions, none appear who had successfully cultivated the physical sciences, or who excelled in mathematics or astronomy. Nature was at that time a sealed book. Roger Bacon, in the preceding century, had been stigmatized as a necromancer, because he delighted in experimental philosophy, and because he was free from that spirit, which had turned all Europe into a scholastic logomachy, where speculative absurdities were discussed in a barbarous jargon, and a corrupted theology defended, by the

misunderstood logic and metaphysics of the ancients. It was not truth the schoolmen of that day sought for, but victory; and dialectic skill, the substance of which was an ingenious and verbose sophistry, was the great accomplishment of the minds of that period.

But ecclesiastical domination of this character, was soon to be put on the defensive. Wickliffe, by his translation of the Scriptures, gave a death-blow to the scholastic system; he laid the foundation of a reformation in religion, by teaching men how to look into the sources of divine truths. Next came the age of printing, of the Medici, of the learned and witty Erasmus, who having been brought up by the schoolmen, knew them well. Then followed Copernicus, Luther, the second Bacon, Galileo, Kepler, and those great mathematicians and astronomers who prepared the way of the physical sciences for the immortal Newton. As this flood of light then impending over the human mind advanced, the influence of the scholastic philosophy began to decline. Luther had said, that neither religion or philosophy could be reformed, until the system of metaphysical theology should be abolished. Fifteen years after his death, arose the great intellectual reformer, Lord Bacon. He taught that the qualities of bodies are only to be known by experiment; and that in the pursuit of knowledge, we must proceed step by step from what we know, till we arrive at results governed by principles of universal application. His great mind disdained to occupy itself with the relation of words with each other, which was the system that had so long enslaved the human mind, but applied its powers to the philosophical relation between words and things.

It was in the early part of the sixteenth century, that fossil organic remains began to attract the attention of the curious, and speculations to be indulged in concerning their origin. But these first efforts in favour of natural history were restrained by the same bigotry, which, at a later period, consigned Galileo to the dungeons of the inquisition. At first it was not permitted to any one to attribute their origin, in relation to the situations in which they are found, to any agency but that of the Noachic deluge; men who reasoned otherwise, were pronounced infidels, and treated as such; and when it was demonstrated that they were occasionally found in situations where the Noachic deluge

could have no agency in placing them, then it was said, that they were not the remains of animals, but that they were sports of nature, formed in the earth by a "plastic force." Thus was it attempted to stifle, in its infancy, the study of the structure, and the early history of our planet, as it had before been attempted to suppress the knowledge of the true theory of the solar system.

Over these efforts of ignorance, time has prevailed, happily vindicating the freedom of human thought, both in religion and physics. The benign influence of this freedom of opinion has immeasurably extended the power of man. Science and the arts have enabled him to visit the most distant countries with certainty and punctuality; to collect facts from every quarter, accumulating them, and the information derived from them, so as to give an almost physical ubiquity and omniscience to the general mind. If, as we have before said, the general and individual happiness depends upon the extent to which this kind of knowledge is possessed, it becomes an interesting inquiry, to examine through unprejudiced witnesses, how far the civilized nations of the world are comparatively in possession of these great advantages. As we take it for granted, no argument is required to prove that an individual is honoured of his fellow men, in proportion to his well applied attainments, and that this kind of consciousness forms the most unequivocal source of happiness to himself, we shall content ourselves with saying, that we believe what may be said of such an individual, may be truly attributed to a nation so distinguished.

Of the attainments of an individual, the world has no means of forming an accurate judgment, but from his acknowledged writings; and it is in this manner we must attempt to form a comparative opinion of the attainments of nations, the works respectively published in each of them, constituting their proper statistics in science and literature. Of these, we shall only concern ourselves with the first, being of opinion, that a correct taste in national literature, depends essentially upon the cultivation of that kind of judgment, which is generated from, and reflected by the study of nature; to say nothing of the utter poverty of that literature, from which the rich illustrations furnished by the inexhaustible realms of the animal, mineral, and vegetable kingdoms, are excluded.

As a detailed catalogue of all the scientific periodicals and publications now circulating in Europe, would be more tedious than instructive; we shall content ourselves with giving such a summary of them, as will forcibly impress upon our readers the importance of the view we have taken of this subject. It will be seen how conspicuous, in this point of view, that enlightened part of the globe is above all the rest; and if in Africa there is not a total blank, it is because a ray of European light has penetrated there, as in New Holland and Java. In the East Indies, we see still greater fruits of that same intelligence. Cuba contributes twice as much to the general stock of information as Norway and Peru. When we come to treat upon the existing state of scientific literature in the United States, we propose to make the application of these comparative statistics, in order to give additional evidence of the truth of the maxim, that "Knowledge is power."

How much the successful cultivation of natural science depends upon the general tranquillity, will appear from the fact, that before the year 1818, when England was beginning to feel the benefit of the repose of the world, the number of periodical works, published in Great Britain, and which took a direct interest in natural history, only amounted to ten. *The Reports of the Board of Agriculture*, which contained some of the earliest geological papers, the *Transactions of the Royal Societies of London, Edinburgh*, and *Dublin*, the *Transactions of the Geological Society of London*, the *Memoirs of the Wernerian Society of Natural History*, and the two monthly journals, now conducted by Mr. Taylor, and united under the title of *The Philosophical Magazine and Annals of Philosophy*. The other two were the *Edinburgh* and *Quarterly Reviews*, where occasional summaries were found of the progress of natural science. But the influence of a general peace, which released so many active minds from a long restraint, was soon felt: distant journeys were undertaken, the study of the modern languages ardently commenced, scientific expeditions commenced by governments, gifted individuals, of various nations, became known to each other, and thus the general illustration of natural history became more easy and more attractive, and the bonds of the human family drawn closer together. Geological knowledge introduced mineral surveying as a profession, and not only led to new undertakings in mining, but to the advantageous ap-

plication of geological principles, to many important mines which had been abandoned. The great afflux of knowledge, flowing in this direction, could not be pent up in the ancient beds, but sought new channels to relieve its own pressure, and to fertilize the minds that were thirsting for it. At this moment, Great Britain publishes about thirty distinct works of the same character, of which five are quarterly, besides five quarterly reviews of literature, of the class of the Edinburgh and Quarterly. In addition to these, are the numerous independent works on various branches of natural history, which are annually published, proceeding from the pens of Buckland, Mantell, De la Beche, Lyell, and a host of others; as well as the papers on natural history found in Encyclopedias, and periodical works more immediately devoted to polite literature. Within the same period, too, have arisen at least forty distinct societies in the various cities and towns of Great Britain, devoted more immediately to the illustration of the geology and natural history of their own neighbourhood; and containing, among their members, many able and enthusiastic naturalists, whose care is to enrich the libraries and collections of their respective societies.

In France, the spirit of inquiry, under all political changes protected by the government, has developed itself in an equally extraordinary manner. Before the year 1818, there were but two journals where natural history was cherished; M. de Blainville's *Journal de physique et d'histoire naturelle*, and the *Bulletin de la societe Philomatique;* at present there are no less than eighteen monthly publications connected with natural science, six of which are published in Paris, besides thirteen annual works that appear under the auspices of societies established in different parts of the country. The total number of regular and irregular works of this character, published in France, is thirty-eight. None of these appear quarterly, and the French periodicals are somewhat deficient in that external neatness which is so liberally bestowed upon those which come from the English press. Neither have the French produced any thing to vie with the splendid sections and illustrations which enrich the Transactions of the Geological Society of London, the beauty of Mr. Sowerby's Mineral Conchology, or the neatness and variety of Loudon's Magazine of Natural History. It is to be regretted, that the country which has produced the Regne animal, the Ossemens fossiles, the

Dictionnaire des Sciences Naturelles, and so many unrivalled works, should be so deficient in this respect.

Germany, including Prussia, which, previous to 1818, issued from the press thirteen works of this kind, of which three were monthly, five were annuals, and the other five the occasional publications of learned societies; has increased her total number to forty, whereof fifteen are monthly, and three quarterly. These are "*Jahrbucher für Mineralogie, Geologie, und* "*Petrefactenkunde*" of Leonhard and Brown. "*Archiv. für Mineralogie und Geognosie*," &c. by Karsten, and "*Kritischer Wegweiser im Gebiete der Landkarten* of Berlin. The German publications are becoming very much devoted to geology. Austria, exclusive of her Italian dominions, contributes twelve publications of this nature, three of which are monthly, and all of them, save one, are posterior to the year 1818. The brother of the emperor, the Archduke John, is a zealous promoter of natural history, and has been at great pains to extend geological reconnaissances over the district under his government. Prince Metternicht, also, has paid a great deal of attention to Geology.* Under the auspices of such men, and through the impulse which will be given to natural science, by the annual meeting of naturalists, composing the *Deutscher Naturforscher Versammlung*, which was to convene this year at Vienna, it is probable that Austria, strong in mineralogy, will soon become distinguished in the cultivation of natural history.

Italy, which before 1818, possessed but five periodicals, has now fifteen, of which ten are monthly, and the Annali of Fusinieri, once every two months. In Russia, which, before 1818, produced only two annual works, there are now twelve, of which six are monthly, the others are published by different societies. The Imperial Mineralogical Society of St. Petersburg, and the Society of Naturalists of Moscow, are patronised by the emperor. In astronomy, Russia is now taking the lead in Europe. Sweden also, since the same period, has tripled her publications, which amount at this time to nine. Denmark has increased hers in the same proportion, and has now three. Norway has one; at Christiania, in that country, geology is a favourite pursuit. Holland possesses five journals, a monthly, a

* See American Monthly Journal of Geology and Natural Science, December 1831, p. 285.

bi-monthly, and a quarterly; the other two are from societies. Belgium has two, Poland two, Sicily two, Savoy two, and Switzerland seven. From the Cape of Good Hope we have the *South African Quarterly Philosophical Journal:* and, above all, a great promise of information in natural history, from the British East India possessions, where there are already three annual publications established, of a high character—the Asiatic Researches, and the transactions of the Bombay and Madras Societies, besides a weekly publication at Calcutta. It is probable, that through the enterprise of the many engineers in that country, in the British service, several of whom unite the character of engineer and naturalist, and the establishment of numerous new societies, that we shall soon be well informed of the natural history and geology of that extensive peninsula. We shall conclude this trans-atlantic statement by adding New Holland and Java, each of which has its scientific society and publication; and by stating, that in the publications we have just enumerated, all those of a strictly literary character are excluded, it being intended only to speak of those, either entirely devoted to natural science, or of such as habitually contain papers on the physical and natural sciences, or reviews of the progress made in them.

In speaking of the state of scientific literature on this side of the Atlantic, we shall first briefly notice De la Sagra's Annales de las Ciencias, begun at the Havana in 1829, and the bi-monthly Journal of Science and the Arts published at Lima. The period of repose may be said to have scarcely commenced for the other governments of South America. We have little doubt, however, that Mexico, whose affairs appear to be in the hands of a wise and moderate government, will soon turn her attention to natural science: the successful working of her mines will call into action the resources of her mineralogists; and happily for her, the school of Del Rio is not yet extinct. That venerable and respected individual is at present in this country, superintending the publication of a work intended for public instruction in his own country, in chemical science. Luis de Alaman, too, one of the ministers of state, is an intelligent and zealous friend to science. In the British American colonies, the cause of natural science is cherished: there is already a scientific society at St. John's, in Newfoundland, a literary and historical society at Quebec, and a society of natural history at Montreal. These

two last mentioned societies have each published a quarto volume.

We now come to speak of the scientific literature of these United States, and first of its periodical works. The *American Journal of Science and Arts*, published at New Haven, Connecticut, is upon the plan of the Scotch scientific quarterlies, a repository for papers of every description, connected with natural and physical science, including mathematics and the mechanical arts. This is a quarterly publication. Next we have "*The Monthly American Journal of Geology and Natural Science*," published at Philadelphia. The leading character of this work is geological, and it may be considered as devoted to the exposition of the geology and natural history of this continent; and to elementary instruction, concerning the principles and details of these important branches of knowledge. Of a similar character, in part, are "*The Journal of the Academy of Natural Sciences, of Philadelphia*," and *The Annals of the Lyceum of Natural History of New York*, both of them the interesting fruits of the labours of the members of these societies. It is to be regretted, that they only appear occasionally. We have also the *American Botanical Register*, published monthly, at Washington. The American Philosophical Society of Philadelphia was founded in 1769; and it has been observed with pleasure, that its transactions of late have shown an increasing inclination to cherish natural history.

We have, besides these, *The Transactions of the Philosophical Society of Cambridge, Massachusetts*, and of the *Albany Institute of the State of New York*, both of them published occasionally. The *Journal of the Franklin Institute of Philadelphia*, and *The American Journal of Improvements in the Useful Arts, of Washington*, are monthly publications, the first, devoted to mechanical arts, and the last, which has also for its title, *Mirror of the Patent Office*, may be considered of the same class. Two other monthly publications are, *Doughty's Cabinet of Natural History, of Philadelphia*, and *The Illinois Magazine*. In the first of these two, natural history is rather the handmaid to the fine arts; and in the latter, which is published in Vandalia, it is brought forward in spirited sketches of western nature. There is also a monthly publication from Boston, *The Naturalist*, a work of a character more descriptive than scientific. In conchology, we have Mr. Say's work,

published at New Harmony, and Mr. Conrad's, published in Philadelphia, both occasional.

To all these may be added, The Monthly Museum of Foreign Literature, Science, and Art, published in Philadelphia, and three literary reviews, quarterly, where scientific subjects are noticed; and a quarterly medical work, published at Lexington, Kentucky, *The Transylvania Journal of Medicine, and the Associate Sciences*, where interesting notices of western botany and conchology have appeared.

It results that there are five quarterly periodicals, eight monthly periodicals, and seven works published occasionally by scientific societies or individuals, all connected, more or less, with natural science, in the United States; and that of these, Philadelphia furnishes one quarterly, four monthly, and three occasionals. Boston and Cambridge, one quarterly, one monthly, and one occasional; Washington, two monthly; New Haven, one quarterly; Charleston, S. C. one quarterly; Lexington, one quarterly; Vandalia, one monthly; New York, one occasional; Albany, one occasional; New Harmony, one occasional.

These are exclusive of the medical, agricultural, horticultural, and miscellaneous publications, somewhat cognate to these pursuits.

It appears, that Philadelphia contributes eight-twentieths of the whole of this scientific literature; whilst New York, with a greater population, does not possess a single periodical of this character, and only occasionally produces the annals of one scientific society. If New York, with a population of 230,000, can do no more for science than this, the propriety of establishing a national society of science there,—as we perceive, has been attempted by a late literary convention held in that city,—as well as the probability of its ultimate success, may be well doubted; for what hope have we that a national society, fitted for the wants of this active age, capable of watching over the interests of science, and of elevating the scientific character of the country, at home and abroad,—which should be the great objects aimed at,—can be raised in the uncongenial atmosphere of a commercial community, which has given no proofs of being in that state of preparation, which invites the establishment of so important an institution as the one now contemplated, and which can only be safely and encouragingly placed under the

government of a community capable of cherishing it, both practically and theoretically? We cannot forget the fate of the Literary and Philosophical Society of that city, or of that most respectable society, the Lyceum of Natural History, which, when it had made, by a great and worthy effort of its members, a very rich collection, and a valuable library, was, by the corporation of the city, turned out of the rooms it occupied, together, we believe, with the Academy of Fine Arts and all its paintings, the Historical Society and its valuable library. The fate, also, of the American Geological Society, established at New Haven, Connecticut, and founded many years ago, should be a warning to the projectors of this new national institution. Its president, William M'Clure, resides in Mexico: where the other officers of the society are, or who they at present are, we do not know; but we do know that the society has neither house, nor home, nor transactions, nor collections; and that this is to be attributed to nothing else but the impossibility of raising an important national scientific institution, in any community where there is not the greatest amount of practical and theoretical knowledge; and in every country, there is one city where these advantages exist, and where they show themselves.

For the opinion we have here expressed, we refer to the undeniable fact, that natural science has been suffered to languish and decay in the city of New York, notwithstanding the acknowledged learning, activity, and zeal of many individuals, and especially of those meritorious persons who have, in the most disinterested and constant manner, and in the face of every kind of adversity, held up the Lyceum of Natural History from total ruin. If, in a wealthy community like New York, which is sometimes prodigal in its patronage of less worthy pursuits, the unostentatious and admirable labours of such men as we have now spoken of, are disregarded, and their collections, with themselves, ejected from their philosophic retreat by the magistrates of the city; if individual friends to science, literature, and the arts, cannot be found in sufficient numbers to sustain the generous, yet modest efforts which have been made; where, we ask, are the working members to come from, of a great national society, that can only flourish through those frequent meetings, and that active and various intelligence and zeal, which are indispensable to the success of such undertakings? Of the inten-

tion of the promoters of this society, we entertain a just and a favourable opinion. There are many good men, and some excellent minds engaged in this project, which deserves a success we do not believe it will meet with. That Philadelphia represents the scientific literature of the country, is evident from the fact of its contributing eight works out of the twenty furnished by the whole United States. We would not say that in this city there are greater minds than in any of the other large cities, but every plant has its region where it flourishes, and in this systematic and rectangular abode of steady men and agreeable women, there is much good sense. The men take time to act, because their actions are the result of system; they take time to think, even in their pleasures, which are moderate and lasting, because they are generally the pleasures of the mind. It is impossible to live long in Philadelphia, without perceiving in the quiet regulations of society, in the comfortable cleanliness, in the benevolent administration of its institutions, and in the temperate, yet general pursuit of knowledge; the influence of that excellent spirit which still hovers over the city of brotherly love, and with which heaven itself seems to have inspired its illustrious founder, William Penn, one of the most conspicuous ornaments of the human race.

The following summary will exhibit the number of scientific publications, as well as the population of the countries whence they are issued:

	Number.	Population.
England	35	22,000,000.
France	38	33,000,000.
Germany, including Prussia,	40	26,000,000.
Austria,	12	32,000,000.
Italy, excluding Austria,	15	9,000,000.
Russia,	12	60,000,000.
Sweden,	9	including Norway, 4,000,000.
Denmark,	3	2 000,000.
Norway,	1	
Holland,	5	6,000,000.
Belgium,	2	
Poland,	2	4,000,000.
Two Sicilies,	2	7,000,000.
Savoy,	2	
Switzerland,	7	2,000,000.
Cape of Good Hope,	1	
East Indies,	4	
New Holland,	1	
Java,	1	
Havanna,	2	

Lima,	1		
British American Colonies,	3		1,000,000.
United States of America,	20	whites,	10,000,000.
	218 total.		

Our readers will be struck with the omission of Spain in this list of nations and communities. At this moment we are not aware of any scientific work, of the character of those we have enumerated, being published in that country, which has a population of 12,000,000. The agitations and embarrassments which have affected both her people and government so long, have been unfavourable to those pursuits, that require private ease and public tranquillity; but the example of the English geologists, who have recently visited that country, and the general spirit of inquiry, will soon rouse her up. The government appears to be by no means insensible to the advantages which attend the cultivation of natural science, and either has established, or proposes to establish, a school of mines at Almaden, the beneficial effects of which will soon be felt. Many students have already been sent to the school of mines at Freyberg in Saxony. In the current literature of this year, published in that country, we observe many valuable works on mineralogy, botany, meteorology, natural history, even treatises on rail roads, which are already constructing there. There is reason to believe that this country, so rich in great and glorious remembrances, and still inhabited by the same high minded race, is making sure and steady advances in those improvements which mark the present age.

The twenty publications we have enumerated, exceed the proportion of the United States, which is about sixteen,—taking England as the standard,—but there are considerations which require considerable abatements to the fair understanding of the comparative state of the scientific literature of this country, with that of Great Britain. In this last country, what is done has a permanent character, because it is well and punctually paid; we do not hear of works undertaken by competent persons being discontinued, for want of encouragement; on the contrary, new publications are constantly appearing under promising circumstances, independent of the various works on natural history, with which the press teems. Here, on the contrary, no original works appear, except the enumerated ones; neither have these a permanent character. The American Journal of Science,

which was first published in 1814, has, according to statements made not long ago to the public, by the editor, barely supported itself, although at the time, it was the only publication of the kind in the country, and was issued at a price not exceeding the average cost of British publications of the same character. The Monthly American Journal of Geology and Natural Science, is but half the price of the last mentioned work; it was published at a low rate, for the express purpose of diffusing itself more amply through the country. The experiment has been of too short duration, to form a proper estimate of its probable success. The other periodicals, we believe, are struggling against their expenses, which absolutely prevent liberal editors from doing justice to their undertakings. Except the transactions of a few societies, the seven occasional works mentioned, have no permanent character, for the same reasons.

In despite of this unfavourable state of things, we are disposed to look upon the appearance of twenty works of a scientific character in the United States, as indicative of a good preliminary state of things; we see in it the cause of natural history putting out its feelers—to use an appropriate figure—in search of nourishment; and we find every confirmation of this opinion, in the increasing interest with which this subject is regarded in private society, and in the other encouragements it has received. Still, when we look at the immense quantity of newspapers published in this country, amounting, we believe, to about nine hundred, all of which must be paid for, and which are evidence of an immense intellectual activity, we cannot but wish that a portion of this patronage were directed to that true kind of knowledge, that leads to a sound and a cheerful state of mind. We shall not be accused of undervaluing the labours of that press which daily ministers to our own information and pleasures when we state that too great a portion of our political country journals are more calculated to confuse, than to enlighten our citizens; who, as to the honesty and ability of our politicians, are left pretty much in the same state of mind with the deaf watchman of Stoke Pogis, whom, during its famous insurrection, having been sent out by some female anti-reformers to reconnoitre, brought back the important information, "that the boys were letting off a great many crackers in the streets, and that there were so many reports, he did not know which to believe." There is

another part of this subject on which we desire to make an observation. It is well known that the French government has the cause of natural science under its own immediate patronage, that no opportunity is neglected by it of cherishing natural history. The establishment of the Jardin des Plantes and its professors, for which specific appropriations are made every year in the ways and means, is a monument of its wisdom. But for the existence of that institution, Cuvier, and many other great names, together with their invaluable labours, would perhaps for ever have remained unknown. The other continental governments, also, more or less cherish natural science. The British government, although it has no establishment like the Jardin des Plantes, encourages, with a munificent hand, these important interests. It is to be mentioned to its honour, that when that most immoral of all systems for raising money from the people, the lottery, was destroyed, the government marked the sense it entertained of the value of the labours of the Geological Society of London, by assigning to it the apartments at Somerset house, formerly appropriated to the lottery office.

We had occasion, a short time ago, to correspond with an enlightened statesman of this country on this subject, and were struck with the following expression in one of his letters:— "From the structure of our government, the patronage of the arts must always be exercised by private wealth and taste, unaided by legislative contribution." We should deplore this, if it were true, and were to comprehend that encouragement due to the physical sciences, which has been so liberally extended to them in other countries. We know not that there is any thing in the constitution of this government, which restrains a congress, disposed to cherish the arts and sciences, from extending to them a wholesome and moderate patronage, during their infancy. We have a precedent in the congressional appropriation for Colonel Trumbull's national paintings; and if ever a national observatory shall be erected in these United States, it must also be authorized by the legislature. The friends of science in the United States, feel it as a deep reproach to this country, which claims some pre-eminence for its free institutions, that it should yet remain without a public observatory; whilst Russia, which we are in the habit of looking upon as the head quarters and source of modern despotism, and whose territory

has come into the pale of civilization, at almost as late a period as that of the United States, stands first and most illustrious, in this most intellectual age, for the protection astronomy has received, and for the progress which it has made. It is not, in our humble opinion, sufficient for the citizens of this great country, that its friendship should be sought on account of its resources, or that we should glory alone in holding up the example of its free institutions, as a light to other nations; we ought to claim some admiration for it, on account of that wise liberality, which, whilst it lays the foundation for some intellectual renown, tends to develope all those resources, which lay within the province of natural science.

To have established a just government among men, is a high meed of praise; to govern so as to bring the greatest attainable quantity of happiness among them, is a still greater: this cannot be done without high intellectual improvement, nor can we conceive of any branch of knowledge more congenial to the ingenious minds of the people of this extensive country, than that comprehended by natural science. A society, too, framed like ours, can best be defended from the dangers of its own institutions, by the only practical equality,—an equality in intellectual attainments: and we must say, that independent of the comforts and facilities which men procure to themselves by the study of nature, and nature's laws, natural history is to be preferred above all other pursuits, for the still more exquisite enjoyment we receive in the contemplation of the power and wisdom of the author of creation.

It is for these reasons we should rejoice to see a moderate appropriation applied by congress, towards the support of an institution for natural history, to be established at Washington; by means of which, the representatives from the different states might acquire sufficient taste and knowledge, not only to turn their attention to their own districts, but to enrich the institution with geological collections. With very moderate means, judiciously employed, a geological map of the United States might be constructed, that would be both useful and honourable to the country; and if something of this kind is not done, this will soon be the only country in Christendom without a proper knowledge of its own mineral resources. Let it be remembered, too, that this is a country fertile above all others, in interesting

natural objects, of which that portion which has been made known to us, creates the most anxious solicitude for what remains unknown. The country, too, where Wilson studied nature so well and feelingly, though for want of patronage he died in poverty; and where Audubon has excelled all other men in the justice which genius can do to nature, though, for the want of the same patronage, he was driven to England to seek his bread. By what extraordinary attainments he found both it, and a fame that will never die, we shall relate in our next number.

LETTER FROM J. J. AUDUBON, TO THE EDITOR.

Bulowville, East Florida, December 31, 1831.

My Dear F.—I have just returned from an expedition down the Halifax river, about 40 miles from this place, and 80 south of St. Augustine. I feel confident, that an account of it will be interesting to you; and I therefore set to.—Mr. J. J. Bulow, a rich planter, at whose house myself and party have been a whole week, under the most hospitable and welcome treatment that could possibly be expected, proposed, three days since, that we should proceed down the river, in search of new or valuable birds; and accordingly, the boat, six hands, and "*three white men*," with some provisions, put off, with a fair wind, and a *pure sky*. I say a pure sky, because not a cloud interrupted the rich blue of the heavens in this *generally* favoured latitude.—We meandered down a creek for about eleven miles—the water nearly torpid yet clear—the shore lined with thousands of acres covered by fall grapes, marshes, and high-palm trees; rendering the shore quite novel to my anxious eye.—Some birds were shot, and secured so as to be brought back, in order to undergo the *skinning operation*.—Before long we entered the Halifax river, an inland arm of the sea, measuring in breadth from a quarter to nearly a mile. The breeze was keen from the north-east, and our light bark leaped over the waves gaily onward, toward the spot which we all anxiously anticipated to reach ere night came on. We did so, passing several plantations on the western bank, and at last reaching a schooner from New York, anchored at what is here called a *live-oak landing*.—Kindly received by the master and his men, we spent the night very agreeably, and as

comfortably as circumstances would permit. At sun-rise the next morning, I and four negro servants proceeded in search of birds and adventures. The fact is, that I was anxious to kill some 25 brown Pelicans, (Pelicanus fuscus) to enable me to make a new drawing of an adult male bird, and to preserve the dresses of the others.—I proceeded along a narrow shallow bay, where the fish were truly abundant. Would you believe it, if I was to say, that the fish nearly obstructed our head way?—believe it, or believe it not, so it was; the water was filled with them, large and small.—I shot some rare birds, and putting along the shore, passed a point, when lo! I came in sight of several hundred pelicans perched on the branches of mangrove trees, seated in comfortable harmony, as near each other as the strength of the boughs would allow. I ordered to back water gently: the hands backed water. I waded to the shore under cover of the rushes along it, saw the pelicans fast asleep, examined their countenances and deportment well and leisurely, and after all, levelled, fired my piece, and dropped two of the finest specimens I ever saw. I really believe I would have shot one hundred of these reverend sirs, had not a mistake taken place in the reloading of my gun. A mistake, however, did take place, and to my utmost disappointment, I saw each pelican, old and young, leave his perch and take to wing; soaring off, well pleased, I dare say, at making so good an escape from so dangerous a foe.

The birds were all gone, and soaring high in the pure atmosphere; but the fish were as abundant as ever. I ordered the net to be thrown overboard; and, in a few minutes, we caught as many as we wanted—fine fish too, bass and row mullets. The porpoises were as busy as ourselves, and devoured them at a great rate.

The tide now began to leave us; and you must know, that in this part of our country, the tide goes down not a-pace, but in a hurry: so much so, indeed, that notwithstanding our rowing before it, we were, on several occasions, obliged to leap into the briny stream, and push the boat over oyster banks sharp as razors.

After shooting some more birds, and pulling our boat through many a difficult channel, we reached the schooner again; and as the birds, generally speaking, appeared wild and few—(you must be aware that I call birds few when I shoot less than one

hundred per day)—my generous host proposed to return towards home again. Preparations were accordingly made, and we left the schooner, with tide and wind in our teeth, and with the prospect of a severe cold night. Our hands pulled well, and our barque was as light as our hearts. All went on merrily until dark night came on. The wind freshening, the cold augmenting, the provisions diminishing, the waters lowering, all—all depreciating except our enterprising dispositions. We found ourselves fast in the mud about 300 yards from a marshy shore, without the least hope of being able to raise a fire, for no trees except palm trees were near, and the *grand diable* himself could not burn one of them. Our minds were soon made up to do—what? Why, to roll ourselves in our cloaks, and to lay down, the best way we could, at the bottom of our light and beautiful barque. Good God, what a night! to sleep was impossible; the cold increased with the breeze, and every moment seemed an hour, from the time we stretched ourselves down until the first glimpse of the morn: but the morn came, clear as ever morn was, and the north-easter as cold as ever wind blew in this latitude. All hands half dead, and masters as nearly exhausted as the hands—stiffened with cold, light clothed, and but slight hope of our nearing any shore; our only resort was, to leap into the mire, waist deep, and to push the barque to a point, some 5 or 600 yards, where a few scrubby trees seemed to have grown, to save our lives on this occasion. "Push, boys, push! Push for your lives!" cry the generous Bulow, and the poor Audubon—"All hands push!" Aye, and well might we push: the mire was up to our breasts, our limbs becoming stiffened, and almost useless, at every step we took. Our progress was as slowly performed as if we had been clogged with heavy chains. It took us two and a half hours to reach the point, where the few trees of which I have spoken were; but, thank God, we did get there.

We landed!! and well it was that we did; for, on reaching the margin of the marsh, two of the negroes fell down in the mud, as senseless as torpidity ever rendered an alligator, or a snake; and had we, *the white men*, not been there, they certainly would have died. We had them carried into the little grove, to which, I believe, all of us owe our lives. I struck a fire in a crack; and, in five minutes, I saw, with indescribable pleasure, the bright, warming blaze of a log pile in the centre of our

shivering party. We wrapped the negroes in their blankets—boiled some water, and soon had some tea—made them swallow it, and with care revived them into animation. May God preserve you from being ever in the condition of our party at this juncture; scarcely a man able to stand, and the cold wind blowing as keenly as ever. Our men, however, gradually revived—the trees, one after another, fell under the hatchet, and increased our fire—and in two hours I had the pleasure to see cheerful faces again. We all got warm again, and tolerably gay, although the prospect was far from being pleasant: no road to go home, or to any habitation; confined in a large salt marsh, with rushes head high, and miry; no provisions left, and fifteen miles from the house of our host.

Not a moment was to be lost; for I foresaw that the next night would prove much colder still. The boat was manned once more, and off through the mud we moved, to double the point, and enter the creek, of which I have spoken, with a hope, that in it we should find water enough to float her. It did happen so, thank God! and as we once more saw our barque afloat, our spirits rose—and rose to such a pitch, that we in fun set fire to the whole marsh: crack, crack, crack! went the reeds, with a rapid blaze. We saw the marsh rabbits, &c. scampering from the fire by thousands, as we pulled our oars.

Our pleasure at being afloat did not last long. The north-easter had well nigh emptied the creek of all its usual quantum of water; and to wade and push our boat over many a shallow, was again our resort, with intent to make a landing, from whence we could gain the sea beach.

We did effect a landing at last. The boat was abandoned—the game fastened to the backs of the negroes—the guns reloaded, and on we proceeded through the marsh first, then through the tangled palmitoes and scrubby sturdy live oaks, until we reached the sea beach.

The sea beach of East Florida—have you ever seen it? If you have not, I advise you strongly never to pay a visit to it, under the circumstances that brought me and my companions to it yesterday morning. We saw the ocean spread broad before our eyes, but it looked angry and ruffly, strewed with high, agitated waves, that came in quick succession towards the desolate, naked shore: not an object in view but the pure sky and the agi-

tated waters. We took up our line of march in a poor plight, believe me. The Poles, on laying down their arms, could not have felt more done up than we did at this moment. Pretty walking along the sea side beach of Florida in the month of December! with the wind at northeast, and we going in its very teeth, through sand, that sent our feet back six inches at every step of two feet that we made. Well, through this sand we all *waded*, for many a long mile, picking up, here and there, a shell that is no where else to be found, until we reached the landing place of J. J. Bulow. Now, my heart, cheer up once more, for the sake of my most kind host—troubled with rheumatic pains as he is. I assure you, I was glad to see him nearing his own comfortable roof; and as we saw the large house opening to view, across his immense plantation, I anticipated a good dinner with as much pleasure as I ever experienced.

All hands returned alive: refreshments and good care have made us all well again, unless it be the stiffness occasioned in my left leg, by nearly six weeks of daily wading through swamps and salt marshes, or scrambling through the vilest thickets of scrubby live oaks and palmitoes, that appear to have been created for no purpose but to punish us for our sins; thickets that can only be matched in the cantos of your favourite Dante.

To give you an account of the little I have seen of East Florida, would fill a volume, and therefore I will not attempt it just now: but I will draw a slight sketch of a part of it.

The land, if land it can be called, is generally so very *sandy* that nothing can be raised upon it. *The swamps* are the only spots that afford a fair chance for cultivation: the swamps, then, are positively the only places where plantations are to be found. These plantations are even few in number: along the coast from St. Augustine to Cape *Carnaveral*, there are about a dozen. These, with the exception of two or three, are yet young plantations. General Hernandez', J. J. Bulow's, and Mr. Durham's are the strongest, and perhaps the best. Sugar cane will prosper, and doubtless do well; but the labour necessary to produce a good crop, is great! great!! great!!! Between the swamps of which I now speak, and which are found along the margin laying west of the sea inlet, that divides *the main land* from the Atlantic, to the river St. John of the interior of the peninsula, nothing exists but barren pine lands of poor timber, and immense savannas,

mostly overflowed, and all unfit for cultivation. That growth, which in any other country is called underwood, scarcely exists; the land being covered with low palmitoes, or very low, thickly branched dwarf oaks, almost impenetrable to man. The climate is of a most unsettled nature, at least at this season. The thermometer has made leaps from 30 to 89 degrees in 24 hours: cold, warm, sandy, muddy, watery—all these varieties may be felt and seen in one day's travelling.

I am extremely disappointed in this portion of the Floridas, and would not advise any one to visit it, because he may have read the flowery accounts of preceding travellers. The climate is much more unsteady than in Louisiana, in the same latitude, or any where along the Mexican gulf to the Sabine river, which is our boundary line. Game and fish, it is true, are abundant; but the body of valuable tillable land is too small to enable the peninsula ever to become a rich state.

I have seen nothing deserving your attention in a geological point of view, except quarries of stones which are a concrete of shells, excellent for building, and laying immediately under the surface of the sand, which every where seems to predominate. This concrete is curious in itself, and my friend, Bulow, who is now erecting some very extensive buildings for a sugar house, has given me specimens, which I will forward to you, showing the different grades or ages of their formation. The fragments are cut out of the quarries with the common wood axe, and fashioned with the same instrument for buildings. You, of course, will readily make out, that the water found in the neighbourhood of all concretes, is hard or calcareous, being filtered through a kind of natural *shell lime.*

I have done but little, I am sorry to say, in *my way.* Birds are certainly not *abundant here at this season;* and I can readily account for this deficiency in the land birds: it is for the want of mast—mast, so abundant in almost every portion of our country. But the water birds, notwithstanding all the fishes in every river, creek, or even puddle, that I have seen, are scarce beyond belief. It is true, a man may see hundreds of pelicans, and thousands of herons; but take these from the list, and water birds will be found very rare. I will see what spring will do, and then write more fully on this my ever devoted subject.

If I did not believe the day to be gone by, when it was ne-

cessary to defend my snake stories, I could send you very curious accounts of the habits of those reptiles; and I should do it, if it were not that I might be thought to enjoy—too much—that triumph which the feeble hostility of three or four selfish individuals has forced upon me. I receive so many acts of real friendship and disinterested kindness, that, I thank God, there is no room left in my heart to cherish unkind feelings towards any one. Indeed, I am not now so much surprised at the incredulity of persons who do not leave cities, for I occasionally hear of things which even stagger me, who am so often a denizen of woods and swamps. What do you think of rattlesnakes taking to the water, and swimming across inlets and rivers? I have not seen this, but I believe it; since the most respectable individuals assure me they have frequently been eye-witnesses of this feat. I can conceive of inducements which reptiles may have for traversing sheets of water to gain distant dry land, especially in a country much intersected by streams, and subject to inundations, which compel them to be often in the water. In such countries, it is not an uncommon occurrence to find snakes afloat, and at great distances from the shore.* This appears, no doubt, surprising to those who live where there is almost nothing but dry land; still they ought to be good natured, and believe what others have seen. It has now been made notorious, that numerous respectable individuals, whom duty, or the love of adventure, have led into the wilds of our country, have often seen snakes—and the rattlesnake too—in trees: the good people, therefore, who pass their lives in stores and counting houses, ought not to contradict these facts, because they do not meet with rattlesnakes, hissing and snapping at them from the paper mulberries, as they go home to their dinners. They should remember that they ought to go farther than that daily distance, if they wish to see any thing extraordinary.

And now, my dear F., adieu. In my next, I hope to give you some account of the St. John's river, and of the interior of the

* Snakes have frequently been met with in England, crossing broad straits. In the Mag. of Nat. History for Sept. 1831, is an account, by Mr. Bakewell, of snakes swimming across the Menai, more than two miles broad, to the Isle of Anglesea, where they deposit their eggs on the low grounds. When swimming they produce an oscillatory motion of the head and neck.—Ed.

peninsula of East Florida, to the exploring of which I mean to devote some time.—Very faithfully your's,

JOHN JAMES AUDUBON.

NATURAL BRIDGE IN ROCKBRIDGE COUNTY, VIRGINIA.

THE celebrity which Mr. Jefferson, in his *Notes on the State of Virginia*, gave to this remarkable natural curiosity, has been deservedly great. He has very eloqently expressed the emotions which an upward view of this "arch, so elevated, so light, and springing as it were up to heaven," excites in the spectator.

In a geological point of view, it is in all respects the same as the natural tunnel so well described by Lt. Col. Long, in our last number; being originally a natural cavity in the limestone rock, (carboniferous,) enlarged by the disintegration of the rock in long periods of time. Cedar creek, the small stream which passes under it, has its source only about two miles from the bridge, where it is only from 20 to 30 feet wide. It cannot be readily supposed, that a limited drainage of this nature could have perforated this rock; we therefore suppose, and for the reasons given in our remarks on Lt. Col. Long's paper, that the stream has always escaped through one of those natural cavities, so abundant in this limestone. The height of the two spurs thus traversed by Stock creek in Scott county, and Cedar creek, in Rockbridge county, are nearly the same; but on account of the comparatively small extent of this natural bridge, which is, as it were, a cavity in the open air, the disintegration of the rock has been much more rapid. In process of time, if nothing is done to arrest annual waste, the whole mineral substance which now forms the arch, will fall to the bottom, leaving a chasm resembling that described by Ulloa, in Angaraez, of which Mr. Jefferson speaks in a note. It is in this slow but sure way, that the appearances on the surface of the earth, are constantly undergoing a variety of changes; especially cavernous hills, exposed to the action of external circumstances.

The comparative dimensions of the natural tunnel, and the natural bridge are as follows:

	Natural Tunnel.	Natural Bridge.
From the stream to the arch,	80 feet.	240 feet.
From the arch to the surface, solid,	160 "	40 "
Extent of the tunnel,	450 "	60 "
Width at bottom,	50 to 100 "	45 "

We hope to do an agreeable thing in presenting our readers with a plate,* of the natural bridge, from a spirited original drawing, taken on the spot; and we conclude our paper with Mr. Jefferson's account of it, from his notes.

"The *Natural Bridge*, the most sublime of nature's works, though not comprehended under the present head, must not be pretermitted. It is on the ascent of a hill, which seems to have been cloven through its length by some great convulsion. The fissure, just at the bridge, is, by some admeasurements, 270 feet deep, by others only 205. It is about 45 feet wide at the bottom, and 90 feet at the top; this of course determines the length of the bridge, and its height from the water. Its breadth in the middle, is about 60 feet, but more at the ends, and the thickness of the mass, at the summit of the arch, about 40 feet. A part of this thickness is constituted by a coat of earth, which gives growth to many large trees. The residue, with the hill on both sides, is one solid rock of lime-stone.—The arch approaches the semi-elliptical form; but the larger axis of the ellipsis, which would be the cord of the arch, is many times longer than the transverse. Though the sides of this bridge are provided in some parts with a parapet of fixed rocks, yet few men have resolution to walk to them, and look over into the abyss. You involuntarily fall on your hands and feet, creep to the parapet, and peep over it. Looking down from this height about a minute, gave me a violent head-ache. If the view from the top be painful and intolerable, that from below is delightful in an unequal extreme. It is impossible for the emotions arising from the sublime, to be felt beyond what they are here: so beautiful an arch, so elevated, so light, and springing as it were up to heaven! the rapture of the spectator is really indescribable! The fissure continuing narrow, deep, and straight, for a considerable distance above and below the bridge, opens a short but very pleasing view of the North mountain on one side, and Blue ridge on the other, at the dis-

* Vide Plate XII.

tance each of them about five miles. This bridge is in the county of Rockbridge, to which it has given name, and affords a public and commodious passage over a valley, which cannot be crossed elsewhere for a considerable distance. The stream passing under it is called Cedar-creek. It is a water of James' river, and sufficient, in the driest seasons, to turn a grist-mill, though its fountain is not more than two miles above."*

COMPARATIVE VIEW OF THE LINNÆAN AND NATURAL SYSTEMS OF BOTANY.

THE republication in this country, of Lindley's Introduction to the Natural System of Botany, with an Appendix by Dr.

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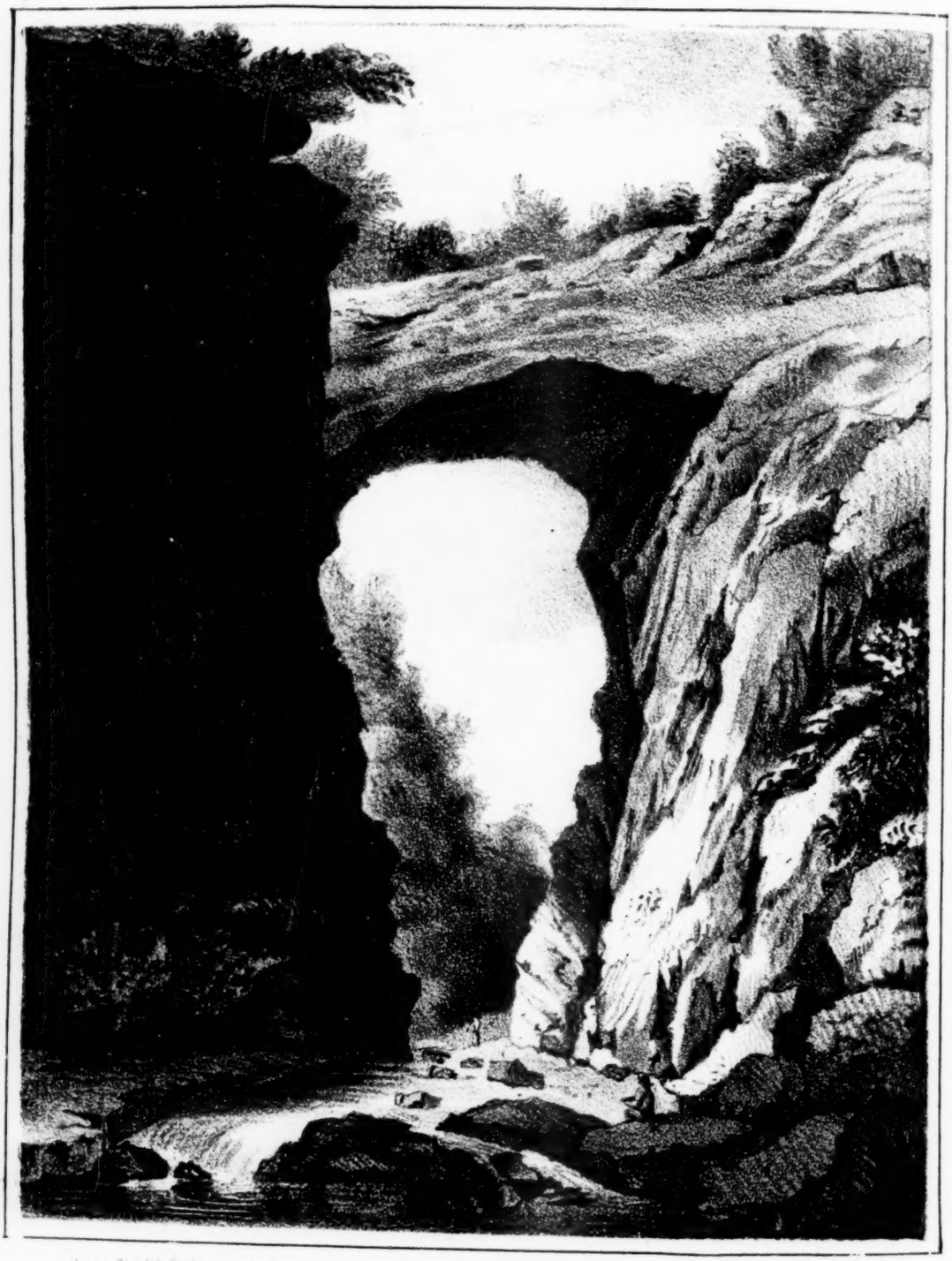
* Don Ulloa mentions a break, similar to this, in the province of Angaraez, in South America. It is from 16 to 22 feet wide, 111 feet deep, and of 13 miles continuance, English measure. Its breadth at top is not sensibly greater than at bottom. But the following fact is remarkable, and will furnish some light for conjecturing the probable origin of our natural bridge. "Esta caxa, ó cauce está cortada en péna viva con tanta precision, que las defigualdades del un lado entrantes, corresponden á las del otro lado salientes, como si aquella altura se hubiese abierto expresamente, con sus bueltas y tortuosidades, para darle transito á los aguas por entre los dos murallones que la forman; siendo tal su igualdad, que si llegasen á juntarse se endentarían uno con otro sin dexar hueco."* Not. Amer. II. § 10. Don Ulloa inclines to the opinion, that this channel has been effected by the wearing of the water which runs through it, rather than that the mountain should have been broken open by any convulsion of nature. But if it had been worn by the running of water, would not the rocks which form the sides, have been worn plane? or if, meeting in some parts with veins of harder stone, the water had left prominences on the one side, would not the same cause have sometimes, or perhaps generally, occasioned prominences on the other side also? Yet Don Ulloa tells us, that on the other side there are always corresponding cavities, and that these tally with the prominences so perfectly, that, were the two sides to come together, they would fit in all their indentures, without leaving any void. I think that this does not resemble the effect of running water, but looks rather as if the two sides had parted asunder. The sides of the break, over which is the natural bridge of Virginia, consisting of a veiny rock which yields to time, the correspondence between the salient and re-entering inequalities, if it existed at all, has now disappeared. This break has the advantage of the one described by Don Ulloa in its finest circumstance; no portion in that instance having held together, during the separation of the other parts, so as to form a bridge over the abyss.

* This chasm is formed in the solid rock with so much precision, that the cavities on one side, correspond with the protuberances on the other, as if the cliff had opened asunder for the express purpose of permitting the water to pass between its walls: the correspondence being so exact, that if the walls could be brought together again, they would fit exactly.



C. Fox Cuckson Engraver Press.

THE NATURAL BRIDGE.

Rock-Bridge County Virginia.

Torrey, is the most important step which has yet been taken here, towards investing the science of vegetable nature, with that dignity which belongs to all the branches of natural knowledge, when considered in relation to their usefulness and harmony with universal nature.

No branch of natural history has been so much taught and studied in the United States as botany, through the Linnæan system. Holding, therefore, a very high opinion of the system to which Mr. Lindley's work is introductory, and which, we believe, will ere long supersede the Linnæan system, with all those who investigate for truth's sake, we feel it a duty to give some reasons for the opinion we entertain. We shall, therefore, in accordance with the general plan of our Journal, after some general observations upon natural arrangement, give a somewhat elementary account of the natural system of botany, that our readers may be divested of many of their prejudices against it, and be induced to give it an impartial consideration. We are satisfied that those of our botanical readers who are thus influenced, will be grateful to us for having opened a subject to them, entirely consistent with the true method of studying nature.

There are but two methods of considering the classification of animals and plants, one of which is less appropriate to an advanced state of society, like the present, than the other. The immense number of individual animals and plants in existence, produced, in the earliest stage of society, of necessity, an imperfect classification. The first rude method, was to call all the inhabitants of the waters, fishes; all the winged animals, birds. The distinct individuals of these elements, were recognized and named, generally, after some external mark which distinguished them. All classifications and arrangements depending upon generalizations; and principles of this nature, are artificial and incomplete. They disclose nothing concerning the place and functions individuals occupy in the scheme of universal nature, and are only fitted for that indolent infancy of natural knowledge, which precedes the conception of immutable and universal principles of affinity.

The other method, which grows out of a more attentive study of nature, is the one appropriate to an advanced state of society; when men have examined extensively into natural phenomena,

when the spirit of analysis is in full action, and when they are pursuing the intimate knowledge of nature's laws of organization, through those principles of affinity, by improved optics and improved reasoning. To that natural system of considering organized beings, which is founded upon observation of the agreement of a particular animal or plant, to all other animals and plants, man has made but slow advances, owing to the human mind, at its most active periods, having been principally engaged in speculative inquiries, and to the general ignorance of comparative anatomy, both animal and vegetable. It is true, men, at an early period, might discover that there was a very wide difference among the animals they called fishes, since a whale, which dwells in the water, and has—the tail fin excepted—the external form of a fish, respires by lungs as we do, and not by gills; brings its young alive into the world, and suckles it. The bat also, although it flies in the air, and at a distance is an apparent bird, has no feathers, but is a true quadruped, with claws to its winged fore feet, as well as its hind feet, has ears, brings forth its young alive, and suckles it from teats at its breast. Hence, it being perceived that some animals belonging to the water and the air, had important functions in common with many living on the earth, it was a simple step to class them together; and thus the class mammalia, to which man belongs, was established, and placed at the head of the animal kingdom, as that class of animals, whether living on the earth, in the waters, or flying in the air, which suckles its young. A classification in zoology, which subtracts from the mass of animals all those which have an undoubted affinity of character, tending to the same functions, and then subdivides these classes again upon the same principles, promises an arrangement of all animals according to their affinities; for those thus closely resembling each other, would come to be arranged under the same species; species resembling each other under the same genus; genera resembling each other under the same order: and a catalogue of animals thus arranged, would be a true system of animal nature; for the classification, in disclosing the structure of each animal, would explain the purposes in creation, for which it received its distinctive properties.

To effect so true an arrangement of organic nature,—for what is said here of animals, will be found equally true of vege-

tables,—the greatest possible extent of investigation is necessary; not only a just account must be taken of the obvious parts and their constant properties, but refined optical contrivances must be resorted to, in order to discover the true structure and internal arrangement of those obvious parts. In this analysis, a knowledge of chemical and mechanical laws is frequently required, and not unfrequently, when human art is at a stand, analogy, under the guidance of sound judgment, is the only light at hand; for although we may know much of organic structure, of the nature of organic life we know very little.

Of life, we can assert little more, than that the motion contained within the organic structure depends upon it, as the continuance of the form and arrangement of all the parts of the structure, depends upon the motion. The solid parts are for the preservation of the forms of bodies, but the whole of these solids are curiously constructed tissues of net-work, fibres, laminæ, and other contrivances, whereby the fluids can have free passage through them, bringing accessions to their growth, repairing the waste, and carrying away what is superfluous. Whether the forms of bodies at maturity, are but extensions of what was latent in the germ before vitalization, or whether they are due to the vital power peculiar to each individual,—for some species reproduce lost parts,—still, each individual is what it is, in consequence of this complication which we call organization; and it is clear that the properties and functions of species can only be understood by comparative anatomy, which is the study of the organic elements of individuals.

Assuming, therefore, that this is the only true method of establishing a classification of animals, it will not be difficult to show, that the arrangement of vegetables must depend upon the same principles, being organic bodies, elaborated by a vital power. Of this we shall give proofs, first briefly noticing the Linnæan scheme, which no doubt is familiar to most of our readers.

About a century ago, when Linnæus constructed his celebrated artificial system, founded upon the parts concerned in the fructification of plants, the investigation which the structure of plants had received, was very limited. Cumbrous descriptions in the Latin tongue, derived from external characters, stood in the place of the precise trivial names which Linnæus substituted. Rousseau ridiculed the pedantic practice of answering for the

name of a flower, with a long string of Latin words, as though it was the form of an incantation. An agreeable lady writer of the Linnæan school, has prettily said, "It was as though Christian names being unknown, we were to distinguish a family of sisters by personal description; and instead of designating one as Miss Lucy Smith, and another as Miss Mary Smith, we should say, 'Yesterday I met Miss Smith, with black eyes and chestnut hair, who is rather tall, stoops a little in the shoulders, has a pretty little foot, and speaks with a lisp; and I asked her how the Miss Smith was, with blue eyes, auburn hair, pale cheeks, a majestic air, and a mole on her chin.'"

The value of a natural system was well known to that great naturalist, Linnæus, who has even left the sketch of one; but the difficulty of defining the groupes was too great for his day. After unsuccessful attempts by others to found a popular arrangement upon the conformation of the corolla, the fruit, &c. &c., he produced his famous sexual system, founded upon the parts concerned in fructification. The *calyx*, or the outer part, which encloses and protects the bud: the *corolla*, the coloured leaves of the flower which protect the more delicate reproductive parts. The *pistil*, the female organ, which occupies the centre of the flower, and is composed of three parts; the *germen* at the base, the rudiment of the future fruit or seed: the *style*, a small tube proceeding from it, and the *stigma*, at the top of the style. In like manner the *stamen*, or male organ, is composed of three parts; the *filament*, or thread which rises from the base of the flower; the *anther* at its top, and the *pollen*, or fecundating matter lodged within the anther. The *pericarp* is the germen in a mature state, enclosing the seed, as the term denotes. The receptacle is the general connecting base of the fructification.

His classes are formed from one or more of these parts, the order and genus from others. Having divided the vegetable kingdom into twenty-four classes, he established the first ten upon the number of stamens in a flower; and following up his sexual distinction, he called the stamens *andria*, a Greek term for *husband*, and the pistil *gynia*, another Greek term for wife. The orders of the classes are distinguished by the number of pistils; thus, the class *monandria*, containing flowers which have but one stamen, is subdivided into two orders, *monogynia*, which

has but one pistil, *digynia*, which has two. The second class *Diandria*, has three orders, *trigynia*, having three pistils or styles; for it is this latter part of the pistil which is often multiplied.

The eleventh class, *dodecandria*, includes flowers with from eleven to twenty stamens. The twelfth, *icosandria*, has twenty or more stamens affixed to the calyx, and *polyandria*, the thirteenth, has from that number to a thousand, affixed to the receptacle. The remaining classes are established upon the unequal length of the stamens—the union of the filaments—filaments in double sets—anthers united into a tube—stamens proceeding from the germen—male and female organs on different flowers of the same plant, as *monœcia*, (one house,) the twenty-first class: *diœcia*, (two houses,) with each organ on separate plants. The twenty-third class, *polygamia*, embraces plants bearing perfect flowers, and flowers with the separate organs on the same, or on distinct plants. The twenty-fourth class, or *cryptogamia*, comprehends all plants destitute of organs of fructification, such as ferns, mosses, lichens, algæ, and fungi.

Such are the outlines of the celebrated artificial system of Linnæus, so attractive by its apparent simplicity, yet so uninstructive, as far as the laws of nature are concerned; for it is by the aid of these alone, we are enabled to trace natural affinities between plants, both in structure and properties. Mr. Lindley, in his introduction, has well remarked,

"From such principles no naturalists except botanists have deviated; no one has thought of first combining, under the name of animal kingdom, quadrupeds and birds, insects and fishes, reptiles and mollusca, and then of subdividing them by the aid of a few arbitrary signs, in such a way that a portion of each should be found in every group—quadrupeds among birds and fishes, reptiles among insects and mammalia; but each great natural group has been confined within its own proper limits. Botany alone, of all the branches of natural history, has been treated otherwise; and this in modern times."

When we speak of the inefficiency of this artificial system for the knowledge of nature, we desire to speak of Linnæus with all honour, as a great benefactor to mankind, who lived before the true plan of studying nature could be comprehensively laid down; but when we have to draw a comparison between it, and the natural system which now claims to supersede it, we should not act honestly, did we not declare that it is possible to acquire a great knowledge of the Linnæan system of botany,

without advancing much in the knowledge of nature. In one sense, indeed, we apprehend it comes as near to nature as may be profitable to some young persons, with whom botany is a popular study. Every young lady can count how many stamens there are on a plant, and refer it to its class; but does she learn by this, what qualities the plant may possess,—what other plants it is closely allied to, having similar qualities,—or what the structure of the future fruit may be? No! she learns nothing of these; she admires, and she talks Greek. When she takes in her hand the beautiful little *forget-me-not*, (myosotis palustris, L.) she says, "This dear little flower belongs to pentandria monogynia. What a romantic idea! Five husbands and one wife."

(To be continued.)

EXPERIMENT WITH PHOSPHORUS ON A CAT.

A paper read by Dr. Harlan, before the American Philosophical Society, February 17, 1832.

No small degree of interest has recently been excited by the appearance among us of M. Chaubert, of Paris, who professes to have discovered antidotes for some of the most lethal poisons, and his powers of resisting their effects have been successfully demonstrated for several years past, throughout the greater part of Europe. Since his arrival in this country, Mr. C. has repeated most of his experiments, both in this city and in New York,—particularly those with *prussic acid* and *phosphorus*, the former of which he exhibits to animals; the effects of the latter he generally tests upon his own system, swallowing with perfect indifference from twenty to forty grains. Mr. C. has favoured me with the following remarks relative to the operation of this poison on himself. It produces, in the first place, exhilarating effects, succeeded, sooner or later, by a transitory sense of depression or faintness. In the course of a few hours, however, the most powerful and painful aphrodisiacal effects are the consequence: if the dose has been very large, frequently repeated, and especially if he has permitted three or four hours to elapse previous to taking the antidote, his bones become affected with pain and soreness throughout the skeleton, so as to render the usual pressure almost insupportable: his complexion also changes to a

bilious hue, and his bowels become costive. All that Mr. C. has informed me of, concerning the nature of his antidote for phosphorus, is, that it is of an *animal* nature.

Many conflicting opinions are entertained by medical men, in regard to the extent of the deleterious effects of this poison on the animal body; some have even pronounced the substance to be inert, when taken into the stomach in a solid state; and others are of opinion, that its mixture with oil renders it *less* noxious; while Mr. C. positively affirms, that oil renders it a hundred fold more virulent. Some writers affirm, that one quarter of a grain is sufficient, in some cases, to destroy the life of man; and by some German chemists it is stated, that the water in which he had washed phosphorus, being drank by chickens, proved fatal to them. I have heard lately of a patient in Paris, to whom one grain was administered twice daily, for impotency, with fatal effects.

Confused by these conflicting statements, I was desirous of obtaining some satisfactory results; for this purpose, I procured a full grown female cat, and on Tuesday, February 15th, at 10 A. M. administered *eleven grains* of phosphorus, cut into small pieces, and mixed with a table spoonful of milk and water. The animal experienced no uneasiness for the first eighteen hours, nor could I observe any symptoms, referable to the poison; she however passed urine during the evening which emitted the smell of phosphorus, and some irritation existed about the external organs of generation. On Wednesday, she displayed considerable uneasiness; drooped, cried, and during the morning experienced a fit of epilepsy; these symptoms increased apace, and on Thursday night and Friday morning, she was, for the most part, senseless, and expired in spasms at 1 P. M. about three days after taking the poison.

The following pathological symptoms were observed on dissection:—The intestines, for the most part, empty, and much contracted; the liver and kidneys gorged with blood; the former covered with small bright punctuations of blood; the uterus contained three embryons about two weeks old; (the term of gestation in these animals being fifty-six days.) On opening the stomach, the mucous tunic was observed generally inflamed: particularly so about the great curvature, and pyloric portion, which also displayed numerous holes, or abrasions, some of them

much larger than the pieces of phosphorus which she had swallowed; two or three spots were sphacelated, near the pylorus; the mucous coat was also *softened* in its structure; this coat was highly inflamed, and preternaturally softened throughout the duodenum; the same appearances extending the whole length of the intestinal canal, which was nearly empty, with the exception of the rectum, which was distended with hardened fæces, of which it does not appear that there had been any discharge after the administration of the poison: not the least appearance of phosphorus, in a solid state, could be detected in the stomach or intestines, nor even in the fæces when exposed to a high temperature; the poison was most probably all dissolved in the stomach, as the animal was not observed to vomit until the end of the second day of the experiment, and then food only was ejected. The heart and lungs were collapsed; the brain and spinal marrow more than usually dry and pale; several lumbrici were observed in the stomach and intestines, all dead, though the animal was still warm. From this experiment it results, that phosphorus, though not an active poison, is fatal to these animals, when taken into the stomach; that it excites violent inflammation in the mucous membrane, and ulceration of such portions as the solid phosphorus comes in contact with, occasionally attended with sphacelus; that the gastric liquor is capable of dissolving solid phosphorus; and that when it passes in a state of solution into the intestines, it occasions inflammation and softening of the mucous coat generally, contracting the bowels, and inducing constipation; and that the glandular, muscular, and osseous systems, among those parts not immediately in contact, are principally affected by the operation of this poison.*

* The London Medical and Physical Journal, conducted by T. Brady, M. D. R. Batty, M. D. and A. A. Noehden, M. D. Vol. I. page 85, has the following passage:—

"From a letter from Citizen S. lately published in the '*Annales de Chimie*,' it appears that no less than twenty-seven of his poultry, including a turkey hen, all died in the course of a few days, in the most dreadful convulsions. Curiosity induced him to open them, when every thing appeared in a sound state, without any indication of the slightest malady; he perceived, however, that the internal membrane of the gizzard was somewhat tough and shrivelled, like most animal substances, when exposed to the action of heat. In all the different subjects, the stomachs were luminous; the grains, not fully digested, glittered on falling down to the ground; and those which at first sight presented no light, almost instantly ex-

It does not appear that phosphorus exerts any very powerful operation on the uterus, as in this instance no symptoms of abortion were the consequence of so large a dose, notwithstanding the spasms which formed part of the symptoms.

R. HARLAN.

GEOLOGICAL SOCIETY OF PENNSYLVANIA.

AT a meeting of the Society, held in the city of Philadelphia, on the 22d of Feb., 1832, the following officers were elected:—

JOHN R. GIBSON, President.
NICHOLAS BIDDLE, Vice President.
STEPHEN S. LONG, U. S. A., Vice President.
HENRY S. TANNER, Treasurer.
PETER A. BROWNE, Corresponding Secretary.
GEORGE FOX, Recording Secretary.

The following Circular, prepared by the appointed committee, was submitted, and ordered to be printed.

CIRCULAR,

FROM THE GEOLOGICAL SOCIETY OF PENNSYLVANIA.

SIR,—The Geological Society of Pennsylvania, do themselves the honour of transmitting you a copy of their Circular, and ask you to co-operate with them in promoting the objects they have in view.

To have an exact knowledge of the mineral resources of this state, is considered the most important of these objects, and as it is the intention of this Society, to construct, as soon as the proper information is obtained, an accurate Geological Map which shall indicate the mineral topography of the State, you are respectfully requested to return at your earliest leisure, answers to the following queries, and to assist in giving effect to

hibited both light and the smell of phosphorus, when heated. This convinced Citizen S. that there could be only one cause for all these effects, and that they were all produced by the circumstance of his having, four or five days before, thrown out some water through a casement into the poultry yard; which water had served to wash and purify several substances, on which operations of phosphorus had been performed. The phosphorus contained in these waters, in a state of nature, he considered as solely occasioning the death of such a number of domestic animals.

the intentions of the Society, by procuring and furnishing them with the information and specimens now solicited, as far as your opportunities and convenience may admit of. As the proceedings of this Society will be occasionally published in the *Monthly American Journal of Geology and Natural Science*, of this city, the valuable information thus procured will be publicly acknowledged, and its authenticity be satisfactorily established.

QUERIES.

1. In what County of the State of Pennsylvania do you reside, and in what Township or Town?

2. Will you recommend to the Society, individuals in your county, able and well disposed to co-operate with the Society for the furtherance of their objects, noting their places of residence?

3. Will you furnish the Society with, or can you enable it to acquire, a correct geographical sketch of your County or Township, where the mountains and hills with their respective altitude, the vales, plains, and streams, *are laid down from actual survey?*

4. Who is considered the most accurate Surveyor in your County or Township, and where does he reside?

5. If you are not able to furnish a geographical sketch, as spoken of in query No. 3, will you procure for the Society, a plan of the mountains and hills in your County or Township, showing where the ridges are continuous, or where they are divided by water-gaps, or where they are divided from each other by vales or plains?

6. Is there any coal, iron, lead, copper, marble, limestone, or other valuable metals, or simple minerals, in your County or Township—what are they, and in what quantities are they found?

7. Will you distinguish and describe the locality of any or all such substances? Will you procure specimens of them?

8. Is the coal bituminous, or non-bituminous? If both kinds are found, specify the localities.

9. Will you give a sketch of the coal field, showing its extent, with the number and position of the strata of coal observed, their inclination, thickness, and depth at which they are found from the surface?

10. Will you procure for the Society some of the most perfect

fossil coal plants, a specimen of each variety, and will you note the localities from whence they have been taken?

11. Upon what general bed does the coal-field lie; is it limestone, sandstone, clay, shale, or what other simple mineral?

12. Which of the foregoing substances do the strata of coal alternate with?

13. Will you procure for the Society geological specimens, not exceeding four inches square, of the general bed under the coal-field mentioned in query 11, as well as of the alternating beds spoken of in query 12, together with good specimens of every species of fossil organic remains found in all such beds, noting their localities?

14. Are any salt springs, or mineral springs, or is any rock salt found in your County, and whereabouts?

15. What is the depth of the wells which have been dug for brine, and through what mineral beds were the borings made?

16. Will you procure for the Society a perpendicular section of such borings, with the thickness of the various beds, and fossils found in them?

17. Will you procure for the Society, geological specimens, not exceeding four inches square, of the rocks of which the mountains and hills alluded to in query 5 are composed, together with specimens of organic remains, preferring such as have portions of the rock adhering to them?

18. Will you procure for the Society a perpendicular section of any cliffs, or the banks of any ravines, or streams, in your County or Township, giving an accurate description of the various beds of which they may be composed, with the respective thickness of such beds?

19. Will you furnish the Society with geological specimens of such beds, and their fossils, prepared as suggested in query 17?

20. Are there any natural caves in your County or Township? in what formation are they found, in limestone, sandstone, or what bed, and whereabouts are they?

21. Can you give the society information of any fossil skeletons, bones, or teeth of ancient animals, found in them?

22. Were they found laid on the floor of such caves, or were they dug from beds of earth within the caves, and at what depth?

23. Were such beds of earth covered over with a crust of

carbonate of lime, commonly called stalagmite, which had trickled from the roof of the cave?

24. Have any fossil skeletons, bones, or teeth of ancient animals, been found in your County or Township, not within caves?

25. Were they found on the surface of the ground, or buried in the superficial soil of the country?

26. At what depth were they found, and in what sort of soil were they laid, clay, marl, sand or gravel: were any shells, broken cane, or branches of trees found with them: will you particularize the manner in which they were found?

27. Can such skeletons, bones, teeth, shells, &c. be procured for the Society?

28. If they cannot, will you procure for the Society a drawing of these various objects, and will you mention the respective size of each of them?

Please wrap all specimens carefully up, and forward them, packed in a box, by the cheapest and earliest opportunity, addressing the package to Peter A. Browne, Esq., Corresponding Secretary, and giving information by mail, of the time and manner in which the package was sent.

By order of the Society.

JOHN B. GIBSON, *President.*

GEORGE FOX, *Recording Secretary.*

Philadelphia, March 1st, 1832.

The establishment of this Society has afforded a sincere gratification to the friends of geological knowledge, and cannot fail to have a beneficial effect upon the interests of the State of Pennsylvania, by uniting the efforts of those kindred minds, which are found in every part of its extensive territory. In every township of this State, there are, no doubt, individuals, who find their purest pleasures in interrogating nature, and with whom the rocks and minerals of their respective districts are familiar. It is to them this Circular is addressed. The curious information they are constantly acquiring, henceforwards becomes intrinsically valuable. To such individuals it must be a source of lively satisfaction, that the isolated facts they are in possession of, can now be brought forward, as parts of a successful experiment to illustrate the geology and mineralogy of the State of Pennsylvania. We cannot too much commend the

intention of the Society to construct a geological map of the State. When this shall be accomplished, it will be a monument worthy of the labours of the men who have established the first Geological Society in the United States of America, that holds out a most encouraging promise of not being "Vox et præterea nihil." We believe the day is rapidly passing away, when the value of an acre of land is to be estimated solely by its capacity for producing a certain number of bushels of wheat, or cords of wood. How many tons of coal, of lead, iron, copper, *how many pounds of gold*, may be extracted from it? are becoming important inquiries with American land owners. The value of this kind of knowledge will soon become properly appreciated, and then the State Legislatures will furnish the means for the execution of surveys by competent persons, and for the construction of geological maps, which alone give the proper indications of the mineral resources of a State. This will be well understood by and by: in the mean time, it is for zealous individuals to draw the public attention to so great a subject.

The queries in the accompanying Circular, appear to embrace the most interesting objects connected with geology. It rarely occurs that any one district furnishes matter of observation respecting all the objects especially mentioned in this circular, but it appears to us, that individuals will find the objects enumerated which are found in their respective parts of the country: it will not be found very troublesome for any particular individual to furnish the Society with information of what exists around him. We most sincerely hope this most commendable and extensive plan for bringing out the geological information of the State of Pennsylvania, will meet with perfect success. The Society having constituted this Journal the organ of its transactions, we shall do every thing in our power to aid in giving effect to its labours, as well as in rendering justice to individual exertions. To be instrumental in collecting and extending the knowledge of the geology of this State, will be very grateful to us; but, as our object is to make the geological information of any particular part of the country subservient to a knowledge of the general geology of the United States, we beg to intimate to our subscribers who reside out of the State of Pennsylvania, that we should feel ourselves under a great obligation to them, or any of their friends, if they would communicate to us the informa-

tion solicited in the queries of this Circular, respecting the districts in which they may reside, in any part of the United States, or of the Canadas. In doing this, we ask the favour of its being transmitted to us, upon all convenient occasions, by private conveyance, especially specimens, on account of the very great expences to which the establishment of this Journal has subjected us. EDITOR.

METEOROLOGICAL OBSERVATIONS,

Made at Wilmington, Delaware, by Henry Gibbons, M.D.

SUMMARY FOR JANUARY, 1832.

	Therm.	*Barom.*		
Average at sun-rise,	24°.77	*in.*29.90	Proportion of clear weather,	*days* 16
Average at mid day,	36°.53	29.88	Proportion of cloudy,	15
Average at 11 o'clock,			Whole days clear,	12
P. M.	27°.71	29.88	Days on which rain fell,	5
Monthly average,	30°.64	29.89	Days on which snow fell,	2
Maximum, 19th,	57°.	27th,30.30	Quantity of rain,	*in.* 4.66
Minimum, 27th,	6°.	8th,29.04	Quantity of snow,	7.
Range,	63°.	1.26	Quantity of water,	5.50
Warmest day, 19th	49°. 5		Northerly winds prevailed,	*days* 14
Coldest day, 27th,	1°.		Easterly,	8
			Southerly, (S. to W.)	9

An aurora on the 22d, followed immediately by easterly winds, and on the 25th, by a snow storm from the north. No electrified clouds. Several moderate rains, and but little snow. Winds generally light and changeable. The early part of the month, a continuation of the winter of the preceding December; afterwards the weather gradually moderated, and two weeks of pleasant sunshine dissipated almost every trace of the previous cold. The Christiana creek, and the Delaware river, at Philadelphia, opened about the 18th, after having been closed six weeks. But just as the ice had disappeared sufficiently to admit of navigation, winter suddenly returned, with a severe snow storm on the 25th; on which day the thermometer fell from 36°, at sunrise, to 12°, at 11 o'clock, P. M. The next morning the mercury was at 4°; 9° at noon, and had fallen to 2° below zero at 11, P. M. On the 27th, it stood at 6° below zero at sunrise, 8° at noon, and 2° at night; and on the morning of the 28th, 2° below zero at 2 o'clock, and 2° above at sunrise. The range of the thermometer, for a continuous period of 60 hours, was between 6° below and 9° above zero. By this extreme effort, Winter seemed to have exhausted himself. Navigation was again open in little more than a week, and no very severe cold was afterwards experienced. There were three easterly storms during the month, all accompanied with rain or snow.

ERRATUM.—In the summary for December, published in the last number of the Journal, the quantity of rain is stated at two inches, instead of *two-tenths of an inch.*

SCIENTIFIC AND GENERAL MEMORANDA.

Audubon's Birds of America.—We have very great pleasure in stating, that the merits of this great work are beginning to be understood in this, which is the native country of its author. Before his return here, in September last, there were only five copies subscribed for in the U. States; there are now eighteen. The Legislature of Louisiana has authorized a subscription for two copies, and the Legislature of South Carolina for one. We hope this example will be followed by the legislatures of the other States. One copy of this splendid national work adorns the National Library at Washington.

The Bohan Upas and the Valley of Death.—It has now become probable that the wonderful story of the poisonous tree, Bohan Upas, in Java, is a vulgar error; and that the story owes its existence to imperfect accounts of the *Guwo Upas, or poisoned valley*, in that island. This terrific valley was visited by Mr. A. Loudon, on the 4th of July, 1830. The bottom of the valley was "covered with the skeletons of human beings, tygers, pigs, deer, peacocks, and all sorts of birds." From some experiments which were tried upon dogs and fowls, it appears that this valley is what Avernus was supposed to be in ancient fables; and that the phenomenon of the Grotto del Cane exists there upon a great scale. In our next, we shall give Mr. Loudon's account, as we find it in Jameson's January number, for 1832.

Mineralogy and Geology of Nova Scotia.—Messrs. Jackson and Alger, have published, from the Memoirs of the American Academy, their remarks on the mineralogy and geology of Nova Scotia, in a monograph of 116 pages, with a geological map, and four coloured plates. This is the neatest and best executed work on geology, which, as far as we have seen, has been got up in the United States, and is printed at Cambridge, Massachusetts. We shall endeavour to give an early account of its contents.

Volcanic Island of Pantellaria.—This small island lies between Sicily and Africa: it is entirely volcanic. The external border is formed of a succession of beds of trachytic lava, of a light greenish gray colour, *resembling gneiss in its granular, slaty struc-*

ture. Central to this border is a mountain mass 2,000 feet high, composed of pumice and streams of lava; aqueous vapour issues from its sides, and hot springs are found at its foot, which collect into a lake of warm salt water, 6,000 feet in circumference. Sciacca, on the Sicilian coast, lies about 70 miles N.E. from Pantellaria, and through one of the intermediate shoals, the new volcanic island of Hotham, arose in July last.*

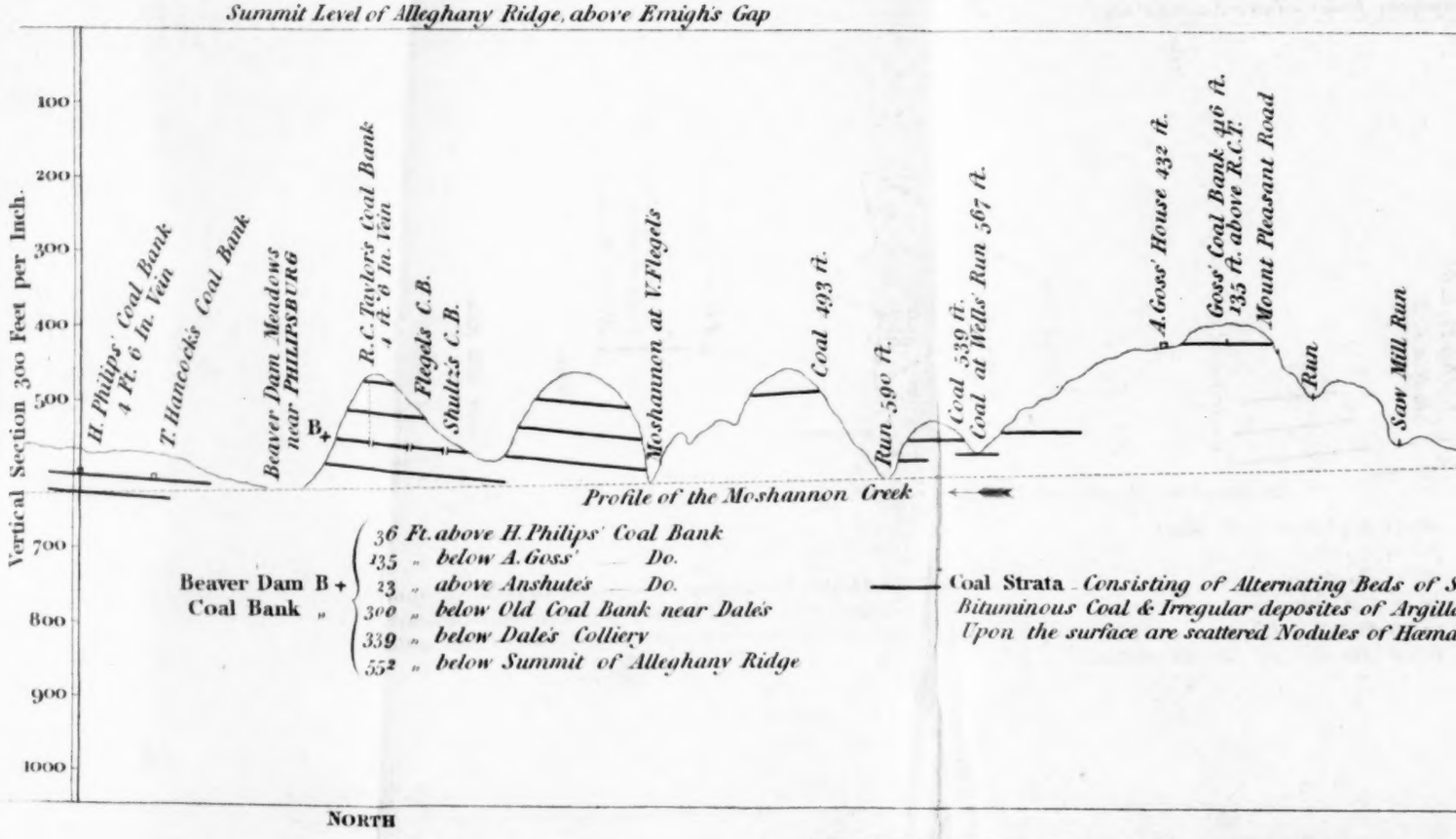
Origin of the Name of the Fish John Dory.—This fish, (*Zeus Faber*, Lin.) notwithstanding its deformity, appears to have been always a conspicuous member of the finny tribe. It has an indent upon each side, as a proof that it was the identical fish St. Peter took hold of with his finger and thumb, in order to take the tribute money out of its mouth. Others have affirmed, that these indents were made by St. Christopher, who, wading through an arm of the sea one day, amused himself with catching them. Hence, its name has been derived from *adoree*. With all reverence for so saintly an origin, we mention that its resplendent golden colour, as we have often witnessed in the Mediterranean, has induced some to suppose the name derived from Dorée, *gilded.* Both these origins, however, leave us to seek for its Christian name John, or Johnny, as it is usually pronounced in the south of England, where it appears in May and June. The fishermen in the Adriatic, who believe in the legend of St. Peter's taking the tribute money out of its mouth, call it by the Saint's official name, *Il Janitore*, or gate keeper, which comes as near to Johnny Dory as an Englishman could pronounce it. Quin, the actor, brought it into vogue; and Sir Joseph Banks said it was the most valuable of fish, because it required no sauce: this may be the hidden meaning of St. Peter's taking the tribute money out of its mouth. He was a fisherman!

* Vide page 314.

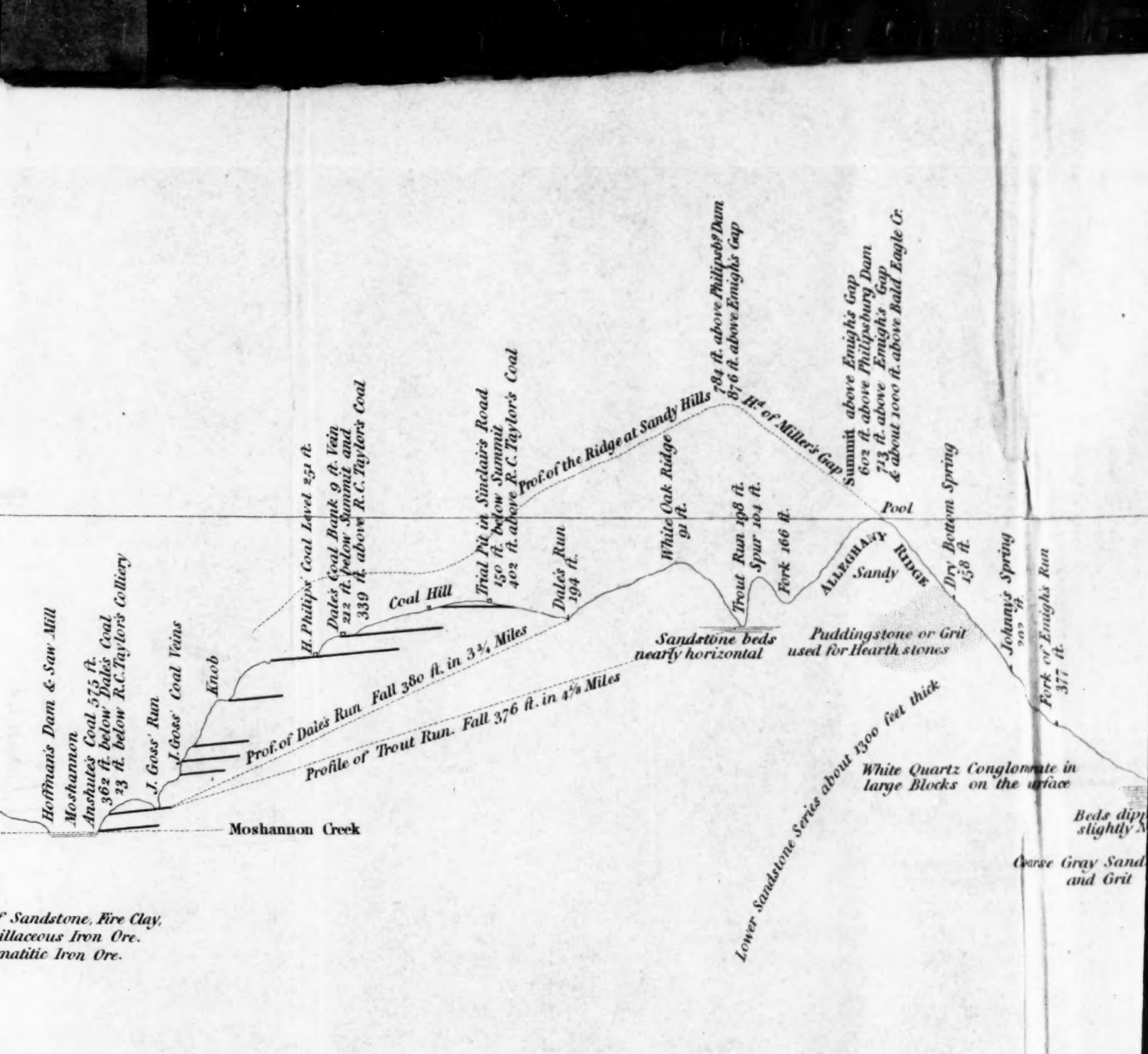
TO CORRESPONDENTS.

The correspondent who forwarded to us a review of Dr. M'Murtrie's translation of the *Regne Animal*, is informed, that, having found leisure to examine the work with more critical attention, we find his remarks substantially correct, and shall publish them in our next number.

Gold Region.—We beg to inform various correspondents, who rather press us on the subject, that if our account of it is not commenced in our next number, it will be for reasons they will approve of. The subject is too interesting to the country to be treated of in the usual common place manner.


Summit Level of Alleghany Ridge, above Emighs Gap
Vertical Section 300 Feet per Inch.
100
200
300
400
500
700
800
900
1000
H. Philips' Coal Bank 4 Ft. 6 In. Vein
T. Hancock's Coal Bank
Beaver Dam Meadows near PHILIPSBURG
B
R.C. Taylors Coal Bank 4 Ft. 6 In. Vein
Flegels C.B.
Shultzs C.B.
Moshannon at V. Flegels
Coal 493 ft.
Run 590 ft.
Coal 539 ft.
Coal at Wells' Run 567 ft.
A. Goss' House 432 ft.
Goss' Coal Bank 46 ft. 135 ft. above R.C.T.
Mount Pleasant Road
Run
Saw Mill Run
Profile of the Moshannon Creek
Beaver Dam B + Coal Bank
36 Ft. above H. Philips' Coal Bank
135 " below A. Goss' Do.
23 " above Anshutes Do.
300 " below Old Coal Bank near Dales
339 " below Dales Colliery
552 " below Summit of Alleghany Ridge
Coal Strata Consisting of Alternating Beds of S
Bituminous Coal & Irregular deposites of Argill
Upon the surface are scattered Nodules of Hæma
NORTH

SECTION of the ALLEGHANY R



f Sandstone, Fire Clay,
illaceous Iron Ore.
matitic Iron Ore.

Horizontal Scale - 1320 Yards to One Inch.

RIDGE, and of a portion of the COAL STRATA in the vicinity of the MOSHANNON

Surveyed by R.C. Taylor, F.G.S.

Engraved for the Monthly American Journal of Geology and Natural Science.